UNIVERSIDAD TÉCNICA DE AMBATO
FACULTAD DE INGENIERÍA EN SISTEMAS, ELECTRÓNICA E INDUSTRIAL
CARRERA DE SOFTWARE
Cdla. Universitaria (Predios Huachi)/ Casilla 334/
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec
AMBATO-ECUADOR

FORMATO DE INFORME

I. PORTADA

UNIVERSIDAD TÉCNICA DE AMBATO
Facultad de Ingeniería en Sistemas, Electrónica e Industrial

Título:	Prueba 2do Parcial
Carrera:	Ingeniería en Tecnologías de la Información
Nivel y Paralelo:	5 TI “A”
Alumnos participantes:	Jonathan Manobanda
Asignatura:	Investigación Operativa
Docente:	Ing. José Rubén Caiza Caizabuano

II. INFORME DEL PROYECTO

2.1 Título

Prueba 2do parcial

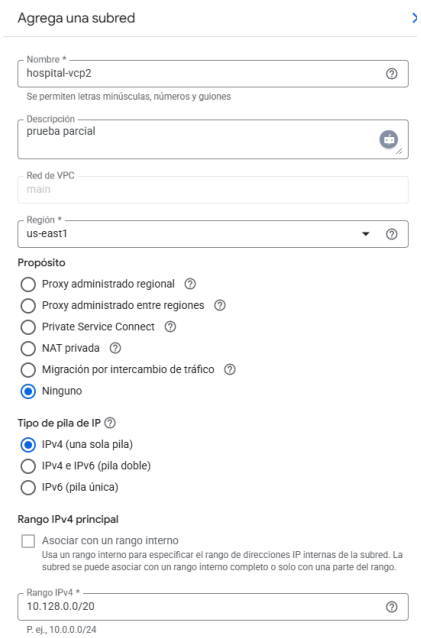
2.2 Objetivo

DISEÑAR Y EVALUAR, EN GOOGLE CLOUD, CINCO ESQUEMAS DE REPLICACIÓN DE BASES DE DATOS

2.3 Resultados y Discusión (Desarrollo)

Capturas de evidencia para cada replicación

RED



hospital-vcp2

Red de VPC
main

Región
us-east1

Tipo de pila de IP
IPv4 (pila única)

Rango IPv4 principal

Rango IPv4 principal	Tipo de acceso	Rango interno reservado
10.128.0.0/20	Internal	Ninguno

Puerta de enlace
10.128.0.1

Acceso privado a Google
Desactivado

Hybrid Subnets
Desactivado

REST equivalente

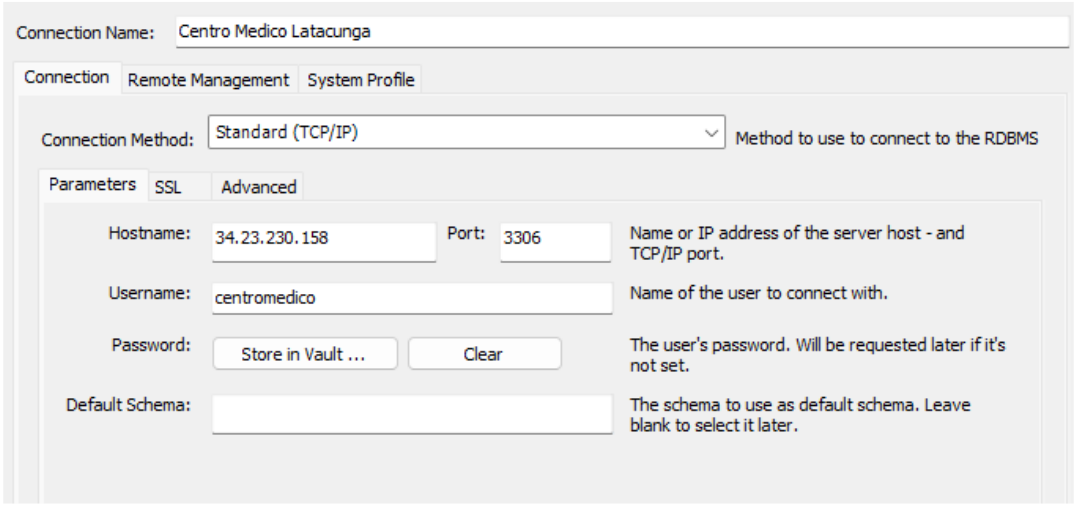
Instancias de VM

Filtro Ingresar el nombre o el valor de la propiedad

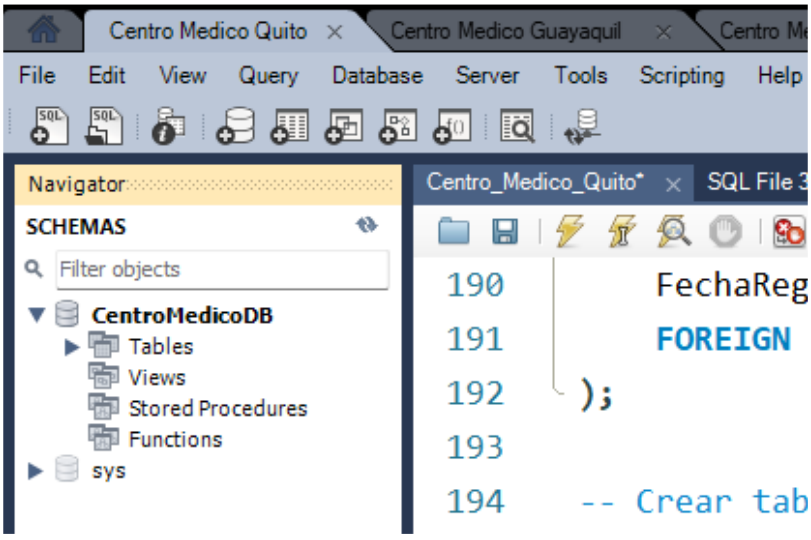
Estado	Nombre	Zona	Recomendaciones	En uso por	IP interna	IP externa	Conectar
✓	hospital-guayaquil	us-east1-c			10.128.0.4 (nic0)	34.138.97.31 (nic0)	SSH
✓	hospital-principal-quito	us-east1-c			10.128.0.5 (nic0)	34.138.196.138 (nic0)	SSH
✓	ubuntu-22lts-1	us-east1-c			10.128.0.2 (nic0)	34.23.230.158 (nic0)	SSH
✓	ubuntu-22lts-2	us-east1-c			10.128.0.3 (nic0)	34.138.113.161 (nic0)	SSH

Replicación activa/pasiva (MySQL)

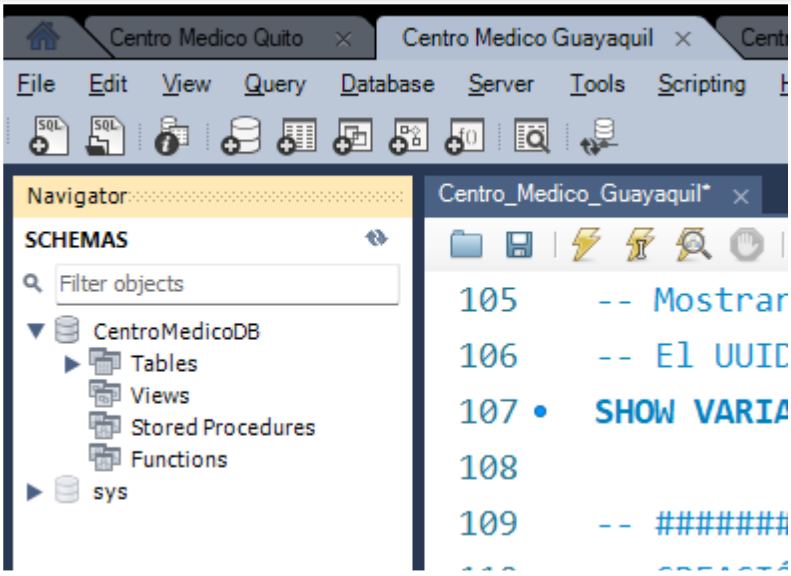
```
jonasjmx@hospital-principal-quito:~$ sudo systemctl restart mysql.service
jonasjmx@hospital-principal-quito:~$ sudo systemctl status mysql.service
● mysql.service - MySQL Community Server
     Loaded: loaded (/usr/lib/systemd/system/mysql.service; enabled; preset: enabled)
     Active: active (running) since Sun 2025-06-08 16:04:10 UTC; 9s ago
    Process: 9867 ExecStartPre=/usr/share/mysql/mysql-systemd-start pre (code=exited, status=0/SUCCES
   Main PID: 9876 (mysqld)
     Status: "Server is operational"
      Tasks: 38 (limit: 2280)
     Memory: 389.0M (peak: 400.8M)
        CPU: 1.812s
     CGroup: /system.slice/mysql.service
             └─9876 /usr/sbin/mysqld
```

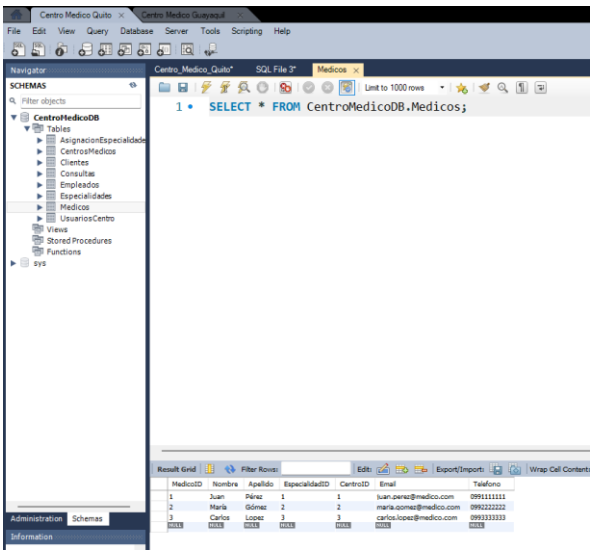


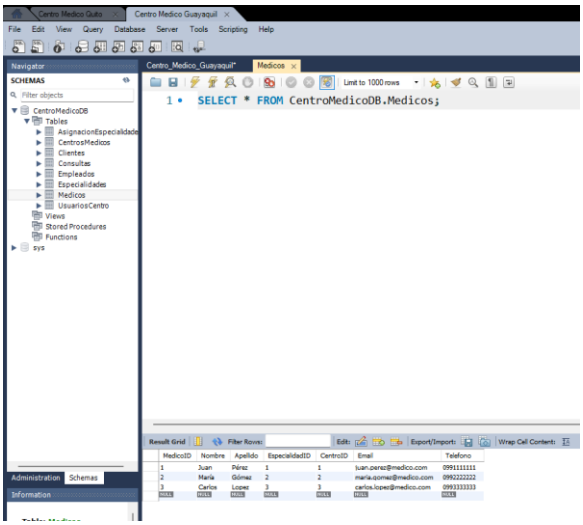
```
-- Crear usuario para replicación
-- Este usuario se utiliza para la replicación entre servidores MySQL.
CREATE USER 'replicator'@'%' IDENTIFIED WITH mysql_native_password BY 'Centromedico@123';

-- Otorgar privilegios de replicación al usuario replicator
GRANT REPLICATION SLAVE ON *.* TO 'replicator'@'%';
FLUSH PRIVILEGES;

-- Eliminar usuarios de replicación (opcional, para limpieza)
DROP USER 'replicator'@'%';
FLUSH PRIVILEGES;

 -- Bloquear y desbloquear tablas (para sincronización)
 FLUSH TABLES WITH READ LOCK;
 UNLOCK TABLES;

 -- Desbloquear IPs bloqueadas (importante en caso de errores de conexión)
 FLUSH HOSTS;

 -- Detener el proceso de replicación en caso de que sea necesario realizar ajustes.
 STOP SLAVE;

 -- Reiniciar la configuración del esclavo para limpiar cualquier configuración previa.
 RESET SLAVE ALL;

 -- Reconfigurar el esclavo con nuevos valores (si es necesario).
 CHANGE MASTER TO
     MASTER_HOST     = '34.138.196.138',              -- Dirección IP o nombre del host del servidor maestro
     MASTER_USER     = 'replicator',                  -- Usuario configurado para la replicación en el maestro
     MASTER_PASSWORD = 'Centromedico@123',            -- Contraseña del usuario de replicación
     MASTER_LOG_FILE = 'mysql-bin.000003',        -- Archivo de registro binario actual en el maestro
     MASTER_LOG_POS  = 5058;                       -- Posición en el archivo binario del maestro

 -- Iniciar nuevamente el proceso de replicación después de la reconfiguración.
 START SLAVE;
```



UNIVERSIDAD TÉCNICA DE AMBATO
FACULTAD DE INGENIERÍA EN SISTEMAS, ELECTRÓNICA E INDUSTRIAL
CARRERA DE SOFTWARE
Cdla. Universitaria (Predios Huachi)/ Casilla 334/
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec
AMBATO-ECUADOR







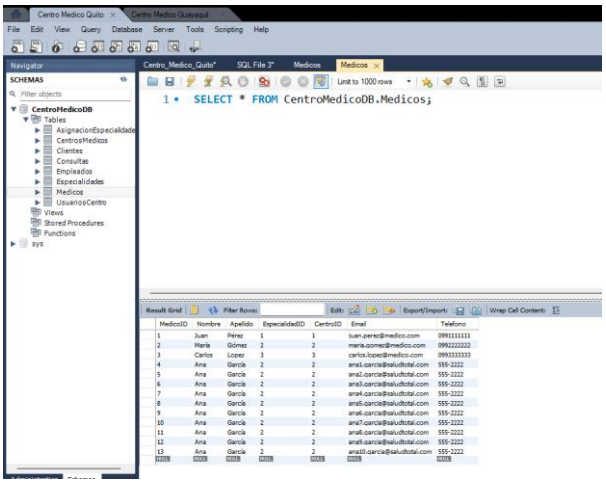
Cdla. Universitaria (Predios Huachi)/ Casilla 334/
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec
AMBATO-ECUADOR

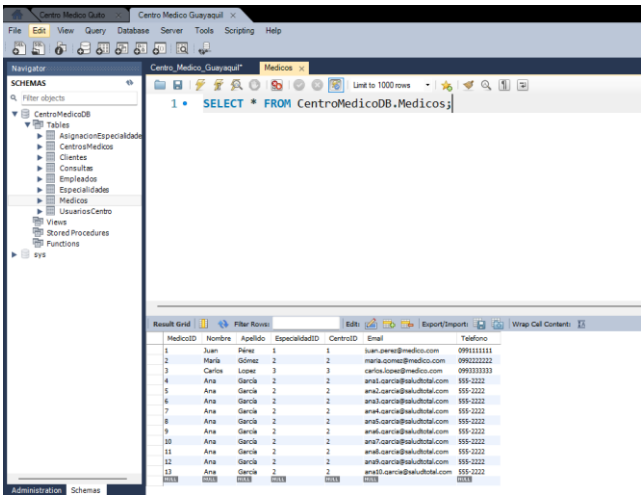

```
104 • INSERT INTO Medicos (Nombre, Apellido, EspecialidadID, CentroID, Email, Telefono) VALUES
105   ('Ana', 'García', 2, 2, 'ana1.garcia@saludtotal.com', '555-2222'),
106   ('Ana', 'García', 2, 2, 'ana2.garcia@saludtotal.com', '555-2222'),
107   ('Ana', 'García', 2, 2, 'ana3.garcia@saludtotal.com', '555-2222'),
108   ('Ana', 'García', 2, 2, 'ana4.garcia@saludtotal.com', '555-2222'),
109   ('Ana', 'García', 2, 2, 'ana5.garcia@saludtotal.com', '555-2222'),
110   ('Ana', 'García', 2, 2, 'ana6.garcia@saludtotal.com', '555-2222'),
111   ('Ana', 'García', 2, 2, 'ana7.garcia@saludtotal.com', '555-2222'),
112   ('Ana', 'García', 2, 2, 'ana8.garcia@saludtotal.com', '555-2222'),
113   ('Ana', 'García', 2, 2, 'ana9.garcia@saludtotal.com', '555-2222'),
114   ('Ana', 'García', 2, 2, 'ana10.garcia@saludtotal.com', '555-2222');
115
116   -- UsuariosCentro
117 • INSERT INTO UsuariosCentro (CentroID, Email, Contrasena) VALUES
```

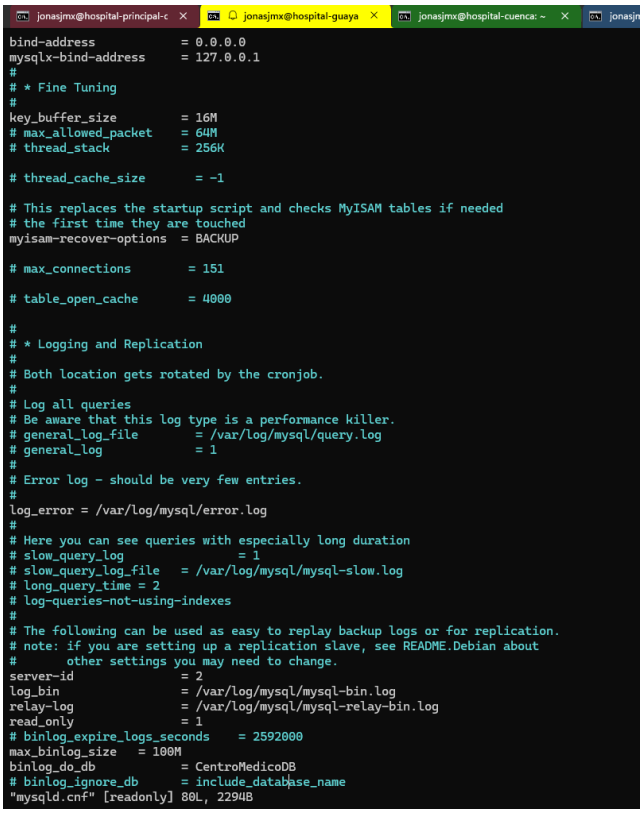
Output

Action Output

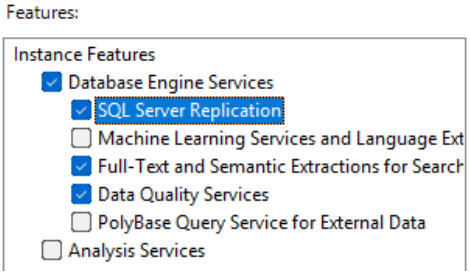
#	Time	Action	Message
1	08:53:40	SELECT * FROM CentroMedicoDB.Especialidades LIMIT 0, 1000	3 row(s) returned
2	08:54:41	SELECT * FROM CentroMedicoDB.Medicos LIMIT 0, 1000	3 row(s) returned
3	08:57:29	INSERT INTO Medicos (Nombre, Apellido, EspecialidadID, CentroID, Email, Telefono) VALUES ('Ana', 'García', 2, 2, 'ana1.garcia@saludtotal.com', '555-...	10 row(s) affected Records: 10 Duplicates: 0 Warnings: 0





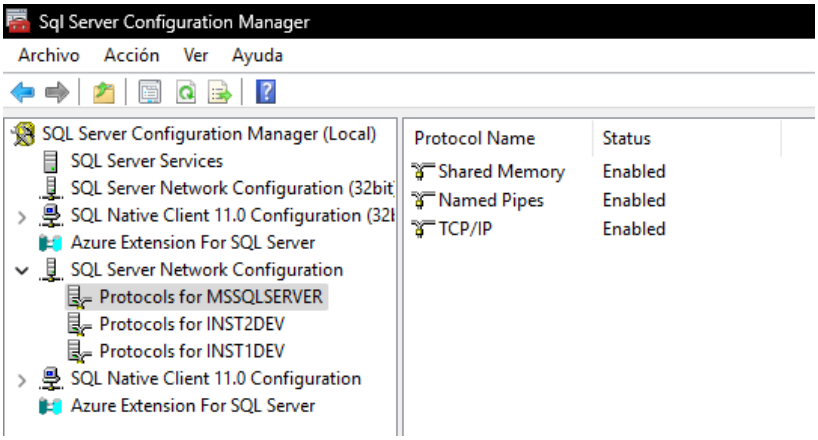


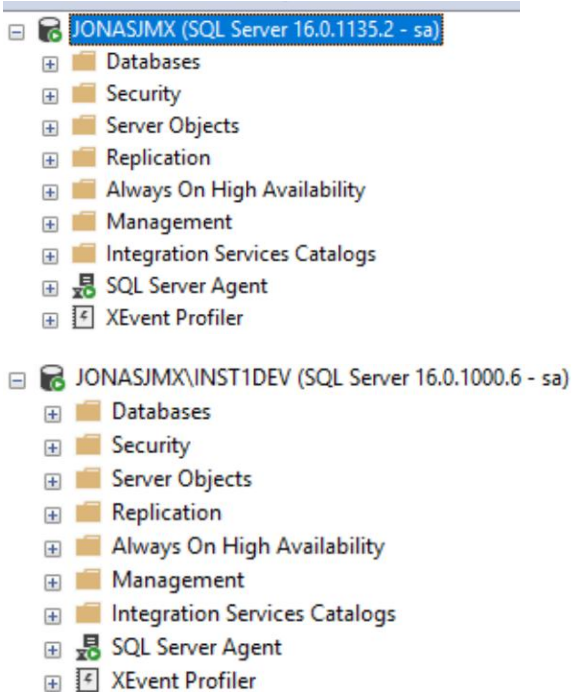
Replicación instantánea, transaccional y merge (SQL Server)

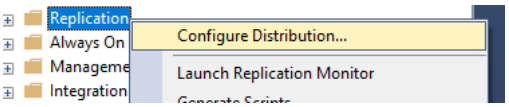


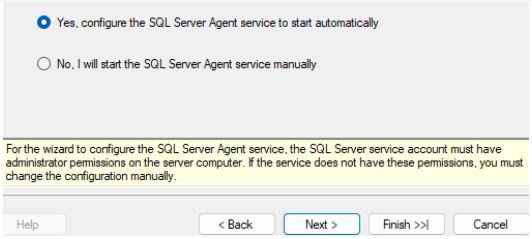
Cdla. Universitaria (Predios Huachi)/ Casilla 334/
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec
AMBATO-ECUADOR

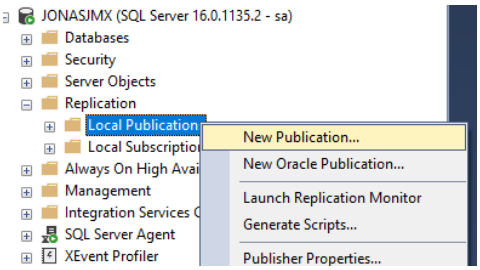
SQL Full-text Filter Daemon Launcher (INST1DEV)	En ejecución	NT Service\MSSQLFDLauncher$INST1DEV	Manual
SQL Full-text Filter Daemon Launcher (INST2DEV)	En ejecución	NT Service\MSSQLFDLauncher$INST2DEV	Manual
SQL Full-text Filter Daemon Launcher (MSSQLSERVER)	En ejecución	NT Service\MSSQLFDLauncher	Automático
SQL Server (INST1DEV)	En ejecución	NT Service\MSSQL$INST1DEV	Manual
SQL Server (INST2DEV)	En ejecución	NT Service\MSSQL$INST2DEV	Manual
SQL Server (MSSQLSERVER)	En ejecución	NT Service\MSSQLSERVER	Automático (inicio retrasado)
SQL Server Agent (INST1DEV)	En ejecución	NT Service\SQLAgent$INST1DEV	Manual
SQL Server Agent (INST2DEV)	En ejecución	NT Service\SQLAgent$INST2DEV	Manual
SQL Server Agent (MSSQLSERVER)	En ejecución	Sistema local	Automático
SQL Server Browser	En ejecución	Servicio local	Manual
SQL Server CEIP service (INST1DEV)	En ejecución	NT Service\SQLTELEMETRY$INST1DEV	Manual
SQL Server CEIP service (INST2DEV)	En ejecución	NT Service\SQLTELEMETRY$INST2DEV	Manual
SQL Server CEIP service (MSSQLSERVER)	En ejecución	NT Service\SQLTELEMETRY	Automático (inicio retrasado)
SQL Server Launchpad (MSSQLSERVER)	En ejecución	NT Service\MSSQLLaunchpad	Automático (inicio retrasado)
SQL Server VSS Writer	En ejecución	Sistema local	Automático

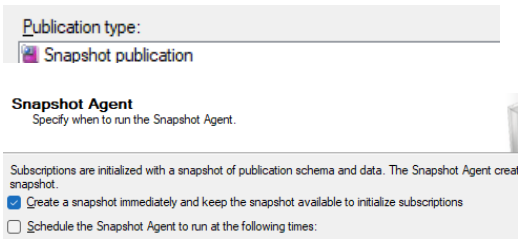


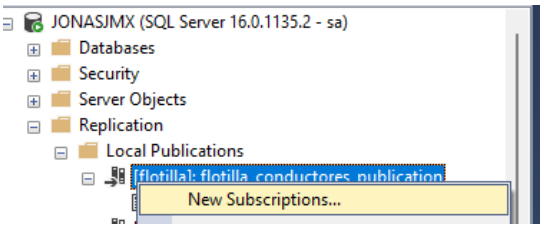


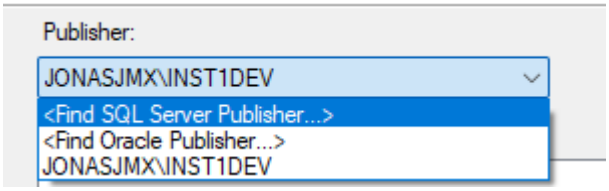


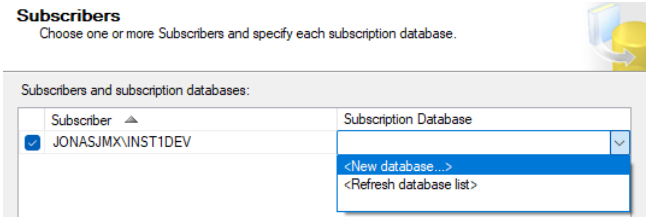

Yes, configure the SQL Server Agent service to start automatically
No, I will start the SQL Server Agent service manually
For the wizard to configure the SQL Server Agent service, the SQL Server service account must have administrator permissions on the server computer. If the service does not have these permissions, you must change the configuration manually.
Help
< Back
Next >
Finish >>|
Cancel

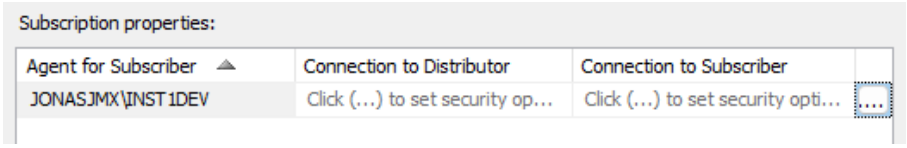

JONASJMX (SQL Server 16.0.1135.2 - sa)
Databases
Security
Server Objects
Replication
Local Publication
Local Subscriptio
Always On High Avai
Management
Integration Services C
SQL Server Agent
XEvent Profiler
New Publication...
New Oracle Publication...
Launch Replication Monitor
Generate Scripts...
Publisher Properties...

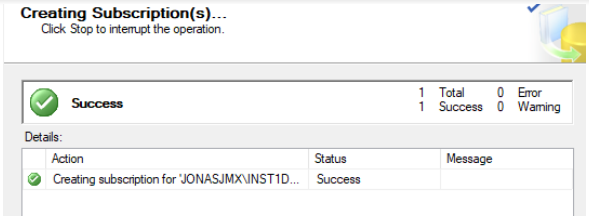

Publication type:
Snapshot publication
Snapshot Agent
Specify when to run the Snapshot Agent.
Subscriptions are initialized with a snapshot of publication schema and data. The Snapshot Agent creat
snapshot.
Create a snapshot immediately and keep the snapshot available to initialize subscriptions
Schedule the Snapshot Agent to run at the following times:

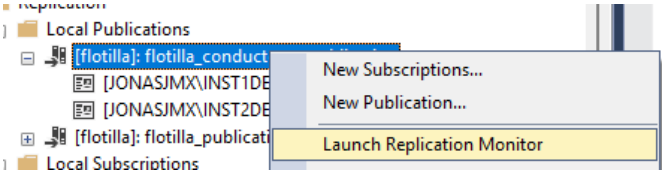

JONASJMX (SQL Server 16.0.1135.2 - sa)
Databases
Security
Server Objects
Replication
Local Publications
[flotilla]: flotilla_conductores_publication
New Subscriptions...

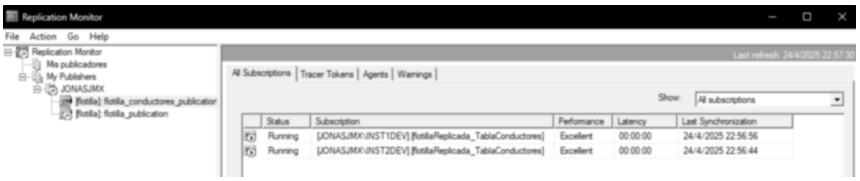

Publisher:
JONASJMX\INST1DEV
<Find SQL Server Publisher...>
<Find Oracle Publisher...>
JONASJMX\INST1DEV

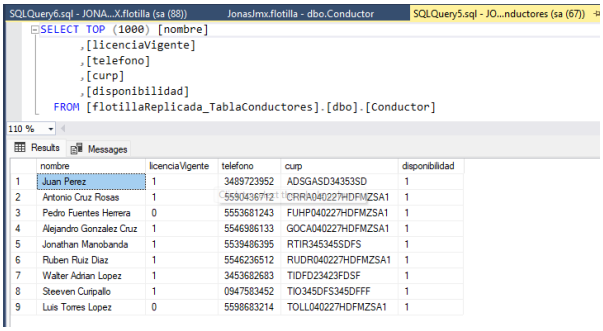

Subscribers
Choose one or more Subscribers and specify each subscription database.
Subscribers and subscription databases:
Subscriber
Subscription Database
JONASJMX\INST1DEV
<New database...>
<Refresh database list>


Subscription properties:
Agent for Subscriber
Connection to Distributor
Connection to Subscriber
JONASJMX\INST1DEV
Click (...) to set security op...
Click (...) to set security opti...









Replicación síncrona (PostgreSQL o Cloud Spanner)

```
jonasjmx@hospital-guayaquil:/etc/mysql/mysql.conf.d$ systemctl status postgresql
● postgresql.service - PostgreSQL RDBMS
     Loaded: loaded (/usr/lib/systemd/system/postgresql.service; enabled; preset: enabled)
     Active: active (exited) since Wed 2025-06-11 14:04:31 UTC; 8min ago
   Main PID: 9909 (code=exited, status=0/SUCCESS)
        CPU: 2ms

Jun 11 14:04:31 hospital-guayaquil.us-east1-c.c.plucky-tract-461200-u4.internal systemd[1]: Starting >
Jun 11 14:04:31 hospital-guayaquil.us-east1-c.c.plucky-tract-461200-u4.internal systemd[1]: Finished >
jonasjmx@hospital-guayaquil:/etc/mysql/mysql.conf.d$
```

```
#------------------------------------------------------------------------------
# CONNECTIONS AND AUTHENTICATION
#------------------------------------------------------------------------------

# - Connection Settings -


#replicacion sincronica
#-----------------------------------------

listen_addresses = '*'
wal_level = replica
max_wal_senders = 10
wal_keep_size = 64
synchronous_commit = on
synchronous_standby_names = 'standby1'

#-----------------------------------------
```

```
# TYPE  DATABASE        USER            ADDRESS                 METHOD

# "local" is for Unix domain socket connections only
local   all             all                                     peer
# IPv4 local connections:
host    all             all             127.0.0.1/32            scram-sha-256
# IPv6 local connections:
host    all             all             ::1/128                 scram-sha-256
# Allow replication connections from localhost, by a user with the
# replication privilege.
local   replication     all                                     peer
host    replication     all             127.0.0.1/32            scram-sha-256
host    replication     all             ::1/128                 scram-sha-256
host    replication     replicador      <IP_STANDBY>/32         md5
```

```
# "local" is for Unix domain socket connections only
local   all             all                                     peer
# IPv4 local connections:
host    all             all             127.0.0.1/32            scram-sha-256
# IPv6 local connections:
host    all             all             ::1/128                 scram-sha-256
# Allow replication connections from localhost, by a user with the
# replication privilege.
local   replication     all                                     peer
host    replication     all             127.0.0.1/32            scram-sha-256
host    replication     all             ::1/128                 scram-sha-256
host    replication     replicador      10.128.0.7/32             md5
```

```
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/postgresql.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/postgresql.conf

jonasjmx@hospital-principal-quito:~$ sudo nano /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf

jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo vi /etc/postgresql/16/main/pg_hba.conf
jonasjmx@hospital-principal-quito:~$ sudo -u postgres psql
psql (16.9 (Ubuntu 16.9-0ubuntu0.24.04.1))
Type "help" for help.

postgres=# CREATE ROLE replicador REPLICATION LOGIN ENCRYPTED PASSWORD 'Postgresql@123';
\q
CREATE ROLE
jonasjmx@hospital-principal-quito:~$ sudo systemctl restart postgresql
```

```
jonasjmx@hospital-guayaquil:~$ sudo rm -rf /var/lib/postgresql/16/main
jonasjmx@hospital-guayaquil:~$ sudo mkdir /var/lib/postgresql/16/main
jonasjmx@hospital-guayaquil:~$ sudo chown postgres:postgres /var/lib/postgresql/16/main
```

```
jonasjmx@hospital-guayaquil:~$ sudo -u postgres pg_basebackup -h 10.128.0.6 -D /var/lib/postgresql/16/
main -U replicador -P --wal-method=stream
```

```
in -U replicador -P --wal-method=stream
Password:
23158/23158 kB (100%), 1/1 tablespace
```

```
#------------------------------------------------------------------------------

# - Connection Settings -

primary_conninfo = 'host=10.128.0.6 port=5432 user=replicador password=Postgresql@123 application_name
=standby1'

#listen_addresses = 'localhost'                 # what IP address(es) to listen on;
```

```
jonasjmx@hospital-principal-quito:~$ sudo systemctl status postgresql
● postgresql.service - PostgreSQL RDBMS
     Loaded: loaded (/usr/lib/systemd/system/postgresql.service; enabled; preset: enabled)
     Active: active (exited) since Wed 2025-06-11 14:42:43 UTC; 3min 43s ago
    Process: 12109 ExecStart=/bin/true (code=exited, status=0/SUCCESS)
   Main PID: 12109 (code=exited, status=0/SUCCESS)
        CPU: 2ms

Jun 11 14:42:43 hospital-principal-quito systemd[1]: Starting postgresql.service - PostgreSQL RDBMS...
Jun 11 14:42:43 hospital-principal-quito systemd[1]: Finished postgresql.service - PostgreSQL RDBMS.
jonasjmx@hospital-principal-quito:~$ sudo -u postgres psql
psql (16.9 (Ubuntu 16.9-0ubuntu0.24.04.1))
Type "help" for help.

postgres=# SELECT * FROM pg_stat_replication;
postgres=# SELECT * FROM pg_stat_replication;
postgres=# \q
jonasjmx@hospital-principal-quito:~$
```

jonasjmx@hospita | jonasjmx@hospita | jonasjmx@hospita | jonasjmx@hospita

```
  pid   | usesysid |  usename   | application_name | client_addr | client_hostname | client_port |
    backend_start         | backend_xmin |   state   | sent_lsn  | write_lsn | flush_lsn | replay_lsn
| write_lag | flush_lag | replay_lag | sync_priority | sync_state |          reply_time
-------+----------+------------+------------------+-------------+-----------------+-------------+-----
-------------------------+-------------+-----------+-----------+-----------+-----------+------------
+-----------+-----------+------------+---------------+------------+-------------------------------
 12484 |    16388 | replicador | standby1         | 10.128.0.7  |                 |       57542 | 2025
-06-11 14:46:16.259823+00 |             | streaming | 0/3000390 | 0/3000390 | 0/3000390 | 0/3000390
|           |           |            |             1 | sync       | 2025-06-11 14:55:05.640059+00
(1 row)
```

```
jonasjmx@hospital-principal-quito:~$ sudo systemctl stop postgresql
jonasjmx@hospital-principal-quito:~$ sudo -u postgres pg_ctlcluster 16 main promote
pg_ctl: PID file "/var/lib/postgresql/16/main/postmaster.pid" does not exist
Is server running?
jonasjmx@hospital-principal-quito:~$ sudo -u postgres pg_ctl promote -D /var/lib/postgresql/16/main
sudo: pg_ctl: command not found
jonasjmx@hospital-principal-quito:~$ sudo -u postgres psql -c "SELECT pg_is_in_recovery();"
psql: error: connection to server on socket "/var/run/postgresql/.s.PGSQL.5432" failed: No such file o
r directory
        Is the server running locally and accepting connections on that socket?
jonasjmx@hospital-principal-quito:~$
```

Réplicas de lectura/escritura en MongoDB

```
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl start mongod
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl enable mongod
Created symlink /etc/systemd/system/multi-user.target.wants/mongod.service → /lib/systemd/system/mongo
d.service.
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl statud mongod
Unknown command verb statud.
jonasjmx@ubuntu-22lts-2:~$ sudo systemctl status mongod
● mongod.service - MongoDB Database Server
     Loaded: loaded (/lib/systemd/system/mongod.service; enabled; vendor preset: enabled)
     Active: active (running) since Wed 2025-06-11 15:44:59 UTC; 57s ago
       Docs: https://docs.mongodb.org/manual
   Main PID: 6068 (mongod)
     Memory: 70.1M
        CPU: 996ms
     CGroup: /system.slice/mongod.service
             └─6068 /usr/bin/mongod --config /etc/mongod.conf

Jun 11 15:44:59 ubuntu-22lts-2 systemd[1]: Started MongoDB Database Server.
Jun 11 15:44:59 ubuntu-22lts-2 mongod[6068]: {"t":{"$date":"2025-06-11T15:44:59.272Z"},"s":"I",  "c":>
jonasjmx@ubuntu-22lts-2:~$
```

```
# for documentation of all options, see:
#   http://docs.mongodb.org/manual/reference/configuration-options/

# Where and how to store data.
storage:
  dbPath: /var/lib/mongodb
#  engine:
#  wiredTiger:

# where to write logging data.
systemLog:
  destination: file
  logAppend: true
  path: /var/log/mongodb/mongod.log

# network interfaces
net:
  port: 27017
  bindIp: 0.0.0.0


# how the process runs
processManagement:
  timeZoneInfo: /usr/share/zoneinfo

#security:

#operationProfiling:

replication:
  replSetName: "rs0"

#sharding:

## Enterprise-Only Options:

#auditLog:

#snmp:
```

```
jonasjmx@hospital-guayaquil:~$ sudo vi /etc/mongod.conf

jonasjmx@hospital-guayaquil:~$ sudo systemctl restart mongod
jonasjmx@hospital-guayaquil:~$ mongosh
Current Mongosh Log ID: 6849a5fce8a0d064c069e327
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
&appName=mongosh+2.5.2
Using MongoDB:          6.0.24
Using Mongosh:          2.5.2

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/


To help improve our products, anonymous usage data is collected and sent to MongoDB periodically (http
s://www.mongodb.com/legal/privacy-policy).
You can opt-out by running the disableTelemetry() command.

------
   The server generated these startup warnings when booting
   2025-06-11T15:51:15.861+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger
 storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
   2025-06-11T15:51:17.330+00:00: Access control is not enabled for the database. Read and write acces
s to data and configuration is unrestricted
------

test>
```

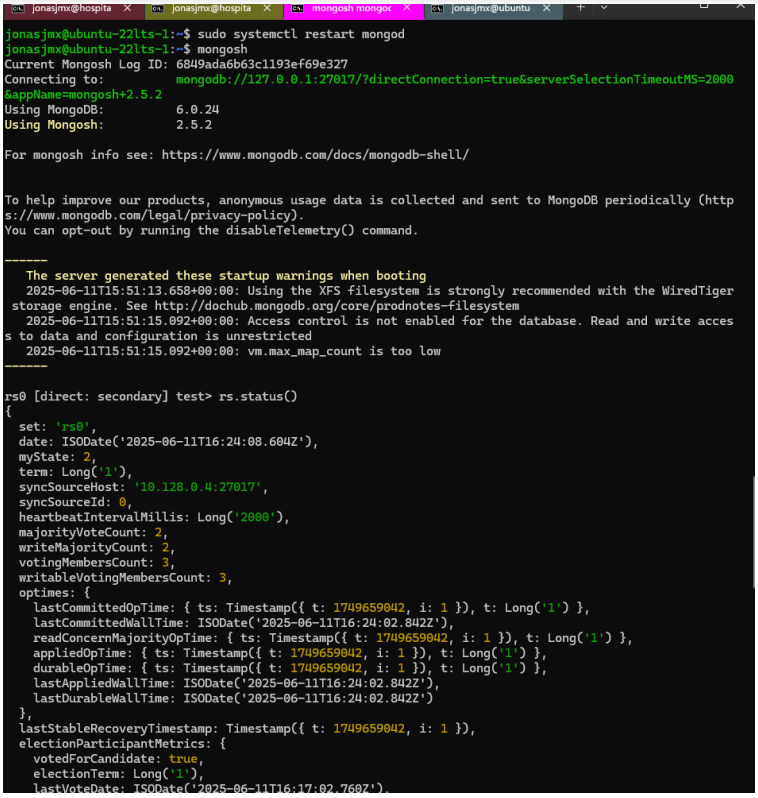
Cdla. Universitaria (Predios Huachi)/ Casilla 334/
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec
AMBATO-ECUADOR

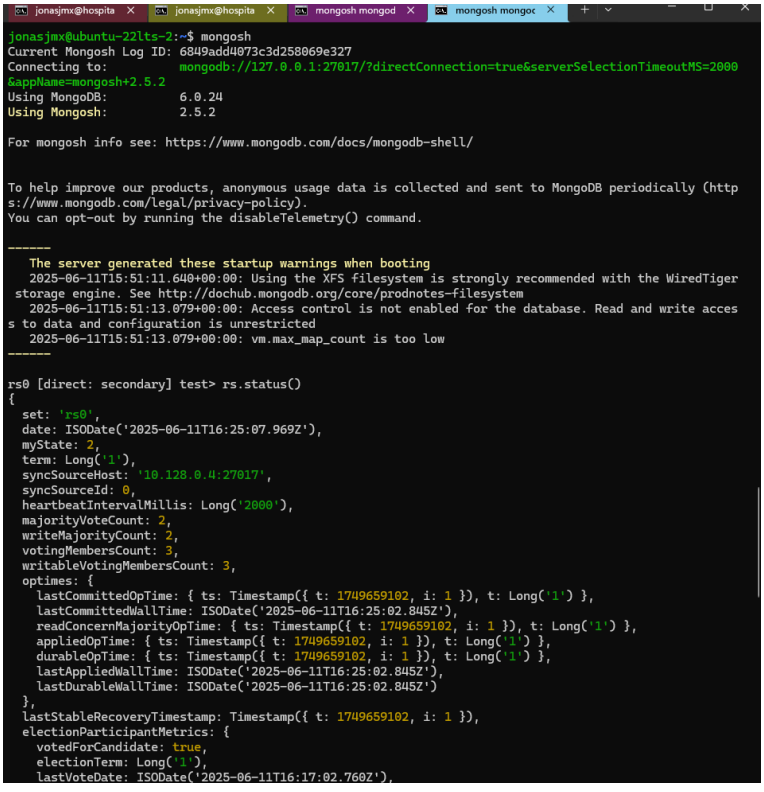

```
test> rs.initiate({
...     _id: "rs0",
...     members: [
...       { _id: 0, host: "10.128.0.4:27017" },
...       { _id: 1, host: "10.128.0.2:27017" },
...       { _id: 2, host: "10.128.0.3:27017" }
...     ]
... })
{ ok: 1 }
rs0 [direct: other] test> rs.status()
```

```
members: [
  {
    _id: 0,
    name: '10.128.0.4:27017',
    health: 1,
    state: 1,
    stateStr: 'PRIMARY',
    uptime: 315,
    optime: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-06-11T16:19:52.000Z'),
    lastAppliedWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    syncSourceHost: '',
    syncSourceId: -1,
    infoMessage: '',
    electionTime: Timestamp({ t: 1749658622, i: 1 }),
    electionDate: ISODate('2025-06-11T16:17:02.000Z'),
    configVersion: 1,
    configTerm: 1,
    self: true,
    lastHeartbeatMessage: ''
  },
  {
    _id: 1,
    name: '10.128.0.2:27017',
    health: 1,
    state: 2,
    stateStr: 'SECONDARY',
    uptime: 183,
    optime: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDurable: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-06-11T16:19:52.000Z'),
    optimeDurableDate: ISODate('2025-06-11T16:19:52.000Z'),
    lastAppliedWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastDurableWallTime: ISODate('2025-06-11T16:19:52.831Z'),
    lastHeartbeat: ISODate('2025-06-11T16:19:52.858Z'),
    lastHeartbeatRecv: ISODate('2025-06-11T16:19:54.340Z'),
    pingMs: Long('0'),
    lastHeartbeatMessage: '',
    syncSourceHost: '10.128.0.4:27017',
    syncSourceId: 0,
    infoMessage: '',
    configVersion: 1,
    configTerm: 1
  },
```

```
    {
      _id: 2,
      name: '10.128.0.3:27017',
      health: 1,
      state: 2,
      stateStr: 'SECONDARY',
      uptime: 183,
      optime: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
      optimeDurable: { ts: Timestamp({ t: 1749658792, i: 1 }), t: Long('1') },
      optimeDate: ISODate('2025-06-11T16:19:52.000Z'),
      optimeDurableDate: ISODate('2025-06-11T16:19:52.000Z'),
      lastAppliedWallTime: ISODate('2025-06-11T16:19:52.831Z'),
      lastDurableWallTime: ISODate('2025-06-11T16:19:52.831Z'),
      lastHeartbeat: ISODate('2025-06-11T16:19:52.866Z'),
      lastHeartbeatRecv: ISODate('2025-06-11T16:19:54.340Z'),
      pingMs: Long('0'),
      lastHeartbeatMessage: '',
      syncSourceHost: '10.128.0.4:27017',
      syncSourceId: 0,
      infoMessage: '',
      configVersion: 1,
      configTerm: 1
    }
  ],
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1749658792, i: 1 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAA=', 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1749658792, i: 1 })
}
rs0 [direct: primary] test>
```

UNIVERSIDAD TÉCNICA DE AMBATO
FACULTAD DE INGENIERÍA EN SISTEMAS, ELECTRÓNICA E INDUSTRIAL
CARRERA DE SOFTWARE
Cdla. Universitaria (Predios Huachi)/ Casilla 334/
Telefax: 03-2851894 – 2411537, Correo Electrónico: carrera.sistemas@uta.edu.ec
AMBATO-ECUADOR





Carpeta de capturas y evidencia con comandos y código:

https://github.com/jonasjmx/Prueba-BDD-2do-parcial